

EFED

Rec. 8/3/06

I017673-001

## DIAGNOSTIC SERVICES SECTION

## FINAL REPORT

SOUTHEASTERN COOPERATIVE WILDLIFE  
DISEASE STUDY (SCWDS)  
COLLEGE OF VETERINARY MEDICINE  
THE UNIVERSITY OF GEORGIA  
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CASE NUMBER CC166-06  
DATE RECEIVED June 28, 2006  
DATE OF REPORT July 30, 2006

STATE TN COUNTY Davidson AREA Nashville

SPECIES (NO.) Gray Squirrel (3) SEX \* AGE \* WEIGHT \*

* Female	Adult	454 g
Male	Juvenile	310 g
Female	Immature	270 g

**CASE HISTORY:** A homeowner reported an incident involving gray squirrel mortality to Mr. Roger Applegate of the Tennessee Wildlife Resources Agency (TWRA). According to the individual, who contacted Mr. Applegate, "grounds keepers indicated [that] dead squirrels [were] everywhere." An apparently conservative estimate was 10 dead squirrels at the site. Three were collected by Mr. Applegate on June 26, 2006, at approximately 10:00 AM. They appeared fresh and according to the homeowner were not there earlier in the morning. One other squirrel observed by Mr. Applegate seemed to be normal. The carcasses were shipped on June 26 and were received on June 27, 2006. A postmortem examination was performed the next morning.

**FINAL DIAGNOSIS:** Phosphide toxicity

*Zinc phosphide (088601)*  
*or*

*Aluminum phosphide (066501)*

**COMMENTS:** Zinc phosphide and aluminum phosphide are used as rodenticides. The toxic mechanism is the generation of phosphine gas when the parent compound is exposed to the low pH in the stomach. Phosphine damages blood vessels and erythrocytes and eventually causes cardiovascular collapse with respiratory distress and asphyxiation. Toxicosis is usually obvious 15 minutes to 4 hours after ingestion of a toxic dose. Mr. Applegate was informed of the diagnosis by e-mail on July 13, 2006.

**PUBLIC HEALTH IMPLICATIONS:** Humans are susceptible to zinc or aluminum phosphide but exposure is rare and is limited to the handling of bait.

**WILDLIFE IMPLICATIONS:** Accidental deaths of non-target species can occur if bait is applied in an area where such species are likely to encounter it. Rodents and birds readily consume grain laced with zinc phosphide but the pungent odor is reportedly unappealing to other species. Secondary intoxication (i.e. poisoning of predators or scavengers feeding on affected animals) seems to be less common than with some other rodenticides.

**LIVESTOCK IMPLICATIONS:** With proper application of bait, livestock should not be affected. However, any birds or mammals are susceptible if they do consume zinc phosphide or aluminum phosphide.

DIAGNOSTICIAN \_\_\_\_\_

Kevin Keel, DVM, PhD, DACVP

DISTRIBUTION: SCWDS File, Myers, Fox, Marcum, Sumners, Applegate, Mastrotta, Rattner, Piccirilli, Wilson, Knowles

*TSB rec'd 8/16/06  
from Nick Mastrotta*

**GROSS FINDINGS:** All three squirrels have similar lesions consisting of hyperemia of the feet and oral mucosa. *The lungs are variably red, wet, and ooze fluid from cut surfaces. This feature is most severe in the adult female.* No other gross lesions are present. The squirrels are all in fair nutritional condition. Autolysis is not advanced.

**MICROSCOPIC FINDINGS:**

**Adult Female (W06-181):**

Lungs: All sections examined have diffuse hemorrhage and edema

Brain, heart, thymus, salivary gland, thyroid glands, parathyroid glands, spleen, lymph nodes, kidneys, adrenal glands, liver, esophagus, stomach, small intestine and large intestine: No significant lesions.

**Juvenile Male (W06-182):**

Lungs: Diffuse hemorrhage and edema expands alveolar spaces and fills airways.

Brain, heart, thymus, thyroid glands, spleen, lymph nodes, kidneys, adrenal glands, liver, pancreas, esophagus, stomach, small intestine and large intestine: No significant lesions.

**Juvenile Female (W06-183):**

Lungs: All sections have diffuse hemorrhage and edema

Brain, heart, thymus, spleen, lymph nodes, kidneys, liver, esophagus, stomach, small intestine and large intestine: No significant lesions.

**MORPHOLOGIC DIAGNOSIS:**

Lungs: Severe, diffuse, acute hemorrhage, congestion and edema

All three squirrels were similarly affected.

**TOXICOLOGY:**

Pooled samples of stomach contents were positive for phosphides.

The stomach contents were also weakly positive for cyanide. The cyanide levels could be due to non-specific interference with the assay or exposure to sub-lethal quantiles of cyanide due to the consumption of cyanide-containing fruit seeds, such as cherries.

Toxicology was performed at the Furman Laboratory, University of California, Davis.